Name of Organization: USGS-Great Lakes Science Center

Type of Organization: Federal Agency

Contact Information: Dr. Jacqueline Savino

USGS Great Lakes Science Center

1451 Green Road

Ann Arbor MI 48105

Phone: (734) 214 - 7258 **Extension:**

Fax: (734) 994 - 8780

E-Mail: jacqueline_savino@usgs.gov

Project Title: Infrasound barrier for exotic fish control

Project Category: Exotic Species

Rank by Organization (if applicable): 0

Total Funding Requested ($): 100,500 **Project Duration:** 2 Years

Abstract:

The Aquatic Nuisance Task Force is concerned with the movement of exotics into important watersheds. The Illinois Waterway System is an artificial connection that links Lake Michigan with the Mississippi River drainage. An electrical barrier is currently being built in Chicago Canal of the Illinois Waterway System to help prevent the movement of exotic fishes between these watersheds. One exotic fish of interest is the round goby (Neogobius melanostomus). However, no one barrier is likely to prevent 100% movement through the system. We propose to test the effectiveness of infrasound in repelling round gobies from an area. Using a variety of techniques for an integrated pest management control should increase the effectiveness of barriers in preventing movement of exotics into new areas.

Geographic Areas Affected by the Project

States:

- [x] Illinois
- [ ] Indiana
- [ ] Michigan
- [ ] Minnesota
- [ ] New York
- [ ] Pennsylvania
- [ ] Wisconsin
- [ ] Ohio

Lakes:

- [ ] Superior
- [ ] Huron
- [x] Michigan
- [ ] Erie
- [ ] Ontario
- [ ] All Lakes

Geographic Initiatives:

- [x] Greater Chicago
- [ ] NE Ohio
- [ ] NW Indiana
- [ ] SE Michigan
- [ ] Lake St. Clair

Primary Affected Area of Concern: Not Applicable

Other Affected Areas of Concern:

For Habitat Projects Only:

Primary Affected Biodiversity Investment Area: Not Applicable

Other Affected Biodiversity Investment Areas:

Problem Statement:

Round gobies, once introduced into the Great Lakes, have dispersed rapidly throughout each of the lakes. These exotics are extremely aggressive and fecund; they rapidly take over the benthic environment and displace native fishes. Federal, state, and local agencies and task forces are intent on preventing the movement of these exotics into new watersheds such as the Mississippi River. The Illinois Waterway System is an artificial connection between Lake Michigan and the Mississippi River. In a demonstration project, an electrical barrier is currently being built in the Chicago Shipping and Sanitary Canal of the Illinois Waterway System to help prevent the movement of exotic fishes, such as round gobies, between these watersheds. In prior feasibility studies, electrical barriers proved to be over 80% effective in deterring downstream movement of round gobies in the laboratory and almost 100% effective in a small stream scale-up study. However, electrical barriers have not been shown to be entirely successful in preventing downstream movement of fishes. Hence, additional types of barriers should be used to enhance effectiveness in preventing movement across these artificial connections.

To complement the electrical barrier, we propose to determine the effectiveness of an infrasound barrier in repelling round gobies. Infrasound (10 hz) has produced avoidance behavior in chinook salmon and rainbow trout. Infrasound has also been used to repel fish around water intakes or attract fish into fish ladders. Round gobies are known to produce and respond to sound during their mating behavior. However, it is not known if round gobies will avoid an area using certain frequencies of infrasound. A feasibility study is needed to determine if infrasound is another 'tool' that can be useful in preventing movement of exotics into new water systems.

Proposed Work Outcome:

The proposed project will provide repel rates or avoidance/attraction reactions of round gobies to different frequencies of infrasound under controlled laboratory conditions. Round gobies have been successfully held in the laboratory at the Great Lakes Science Center for long lengths of time and will be available for use in this study. The use of infrasound on small groups of test fish will be compared with controls to determine if infrasound prevents round gobies from moving into certain sections of a stream tank. Short term (1 hr) tests will key in on appropriate frequencies. Longer term (24 hr+) will determine if fish accomodate to the infrasound or continue to avoid delineated sections of a test tank. At least three groups of fish will be used to replicate tests at each frequency. If infrasound does repel round gobies, we can test combinations of infrasound and electrical barriers to determine their combined effectiveness in preventing movement across a barrier.

The outcome of this project is to determine the effectiveness of infrasound in repelling round gobies. Such information is necessary in determining further techniques that will increase the effectiveness of barriers in preventing the movement of exotics from one watershed to another.

Project Milestones:	**Dates:**
Project Start	06/2000
laboratory trials	10/2000
laboratory results and report	03/2001
small stream/raceway trials	04/2001
final report	09/2001
	/
	/
	/

☐ Project Addresses Environmental Justice

If So, Description of How:

☒ Project Addresses Education/Outreach

If So, Description of How:

The results of this project will be presented to the Aquatic Nuisance Species Task Force, US Environmental Protection Agency, US Fish and WIldlife Service, and the US Army Corps of Engineers to provide them with a measure of the effectiveness of new technologies in limiting spread of exotics. In addition, professional presentations and a manuscript will aid in disseminating the results of this project.

Project Budget:

	Federal Share Requested ($)	Applicant's Share ($)
Personnel:	4,000	52,000
Fringe:	0	22,000
Travel:	5,000	0
Equipment:	0	0
Supplies:	1,000	4,000
Contracts:	62,000	0
Construction:	0	0
Other:	0	0
Total Direct Costs:	72,000	78,000
Indirect Costs:	28,500	0
Total:	100,500	78,000
Projected Income:	0	0

Funding by Other Organizations (Names, Amounts, Description of Commitments):

Smith-Root, Inc is providing use of infrasound equipment.

Description of Collaboration/Community Based Support:

The Chicago Shipping and Sanitary Canal Dispersal Barrier Team of the Aquatic Nuisance Task Force is exploring all options in trying to prevent the movement of exotics through the connection between the Mississippi River drainage and Lake Michigan.

Smith-Root, Inc. of Vancouver WA, is a collaborator on this project and will provide engineering support in addition to the funding listed above.